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OCT 04 2004
PATENT & TRADEMARK OFFICE

TRANSMITTAL LETTER
(General - Patent Pending)

Docket No.
037/01748

In Re Application Of: Alexander VAISBURD et al.

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
09/757,990	January 10, 2001	TABATABAI, A.	44909	2625	8519

Title: SAG CORRECTION

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Response to Office Action dated July 2, 2004

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Paul Fenster

Signature

Dated: October 4, 2004

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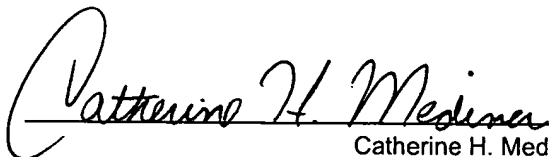
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Applicant: A. Tabatabai
Serial No: 09,757,990
Filing Date: January 10, 2001
For: SAG CORRECTION
Enclosures: (1) Transmittal Letter (2)
(2) Response to Office Action (3) Acknowledgement Postcard.

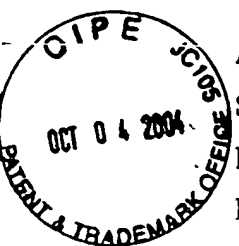
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



Applicant: Alexander VAISBURD, et al.
Serial Number: 09/757,990
Filed: January 10, 2001
For: SAG CORRECTION
Group Art Unit: 2625
Examiner: Abolfazl TABATABAI

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RESPONSE TO OFFICE ACTION

Sir:

The following are applicants' remarks responsive to an Office Action dated July 2, 2004.

Claims 1-3, 6-24, 27 and 28 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ozaki and Hardy. Applicants respectfully traverse the rejection and submit that the combination does not provide a *prima facie* case of obviousness.

Claims 4, 5, 9 and 25 are indicated as having patentable subject matter.

Applicants submit that the Examiner's characterization of Hardy is incorrect. Furthermore, applicants submit that the Examiner's reasoning for the combination of the two references is not correct. Further, applicants submit that the combination of the two references would not result in the claimed invention.

The Ozaki Reference

The Ozaki reference describes a system combining an X-Ray CR system with a CT system. The CT system provides cross-sectional X-Ray absorption information and the CR system provides planar images. The axial positions of (image) slice acquired by the CT system and the CR system are correlated. A lesion (or other anomaly) is first located on the CR image and then the patient is positioned so that the slice produced by the CT system is at the correct axial position on the patient.

The patent, at col. 8, lines 4-34 describes a correction made for off-center position of the lesion. This off-center position has nothing to do with any sag. It corrects for the fact that the x-ray

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beam has a cone-like shape and provides a wrong geometric indication of position of the lesion on the CR imager (col. 8, lines 9-17) and can be quite large, for example if the lesion is near the outer periphery of the body. Ozaki estimates the change in z axis position at the CT based on various data at the CR. None of this data has anything to do with the position of the patient at the CT. There is no correction for sag at the CT. Rather, it has to do with the position at the CR, with errors caused by the geometry of the source and the detector of the CR causing errors in z (axial) positioning of the slices.

Furthermore, it should be understood that the two images in Ozaki are never aligned. In fact, it is hard to imagine how they could be aligned since they are views from different directions. Even if there were some way to align them, one could easily align them using physical markers intrinsic in the image so that there would be no motivation to correct for sag in any event.

Finally, in standard CT imaging (which is all that is described in Ozaki), the sag of the table is of no interest. Each slice is correctly taken no matter what the sag. The only effect of the sag is to change the reference height of the image. However, since such images do not have external references, there is nothing to be gained by correcting for the sag.

The Hardy Reference

The Hardy reference describes a system for radiotherapy. In such systems it is important to know the exact three dimensional position of the lesion being treated. The resolution of 1000's of a mm (col. 4, line 48) is orders of magnitude better than anyone would ever need in any imaging situation where the resolutions are one or more orders of magnitude worse. Hardy suggests that his method is better than trying to make the table stiffer. However, this is only the case because Hardy has very high positional requirements, much higher than those of CT. Thus, whatever the method of Hardy, it would hardly suggest itself for determining sag in an imaging system.

As best understood by the undersigned, in Hardy a frame is attached to the table and the coordinates of the frame are determined and aligned with the coordinate system of the therapeutic system. The frame is placed on the head of the patient and the position of the lesion with respect to the frame is determined. This then allows for the alignment of the lesion with the coordinate system of the radiotherapy beams. The alignment of the lesion with the frame is performed using imaging, but this is not performed on the couch, since the equipment for radiotherapy of Hardy is not adapted for imaging a patient. At most a phantom is imaged as part of the zero-centering

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process of the system. The alignment of the frame with the rest of the system is performed with a laser measurement system.

Combining Ozaki and Hardy

The Examiner has suggested that it is obvious to use the method of Hardy for determining position with the system of Ozaki. Applicants submit that making this combination is clearly not *prima facie* obvious.

1) There is no motivation to provide information regarding sag in Ozaki

The Ozaki reference is entirely silent regarding the presence of sag and there is no reason for correcting for sag in Ozaki. As indicated above, this is because for the CT measurement made, the sag does not matter at all. There is absolutely no utility indicated in Ozaki for knowing the x variation accurately at the CT, since, as indicated above, there is no overlaying of the images.

Furthermore, as indicated above, there is not even an issue of sag in the image in Ozaki. In CT imaging of the type shown in Ozaki, the sag is not a factor.

2) The method of Hardy is not appropriate for determining sag in Ozaki

As indicated above, the methodology of Hardy is meant to provide extremely high resolution of the position of the lesion. This precision is not needed in Ozaki. Even were one motivated somehow to determine the sag, there would be no reason to use the method of Hardy. Absent such motivation, there is no *prima facie* case of obviousness.

Furthermore, Hardy utilizes a laser system to determine the position of the frame. This is appropriate for the system of Hardy, in which the laser measurement is made at the position in which the radiotherapy is to be performed. In Ozaki, the CT system obscures the head and frame so that the measurement would be difficult to make (if possible). This would make it unobvious to use the system.

For accuracy, Hardy's method requires that the measurement with the laser positioning system be made at the position of the table that the radiotherapy is taking place. When the table moves between images on the CT, as in Ozaki, there would be a requirement to make the measurement multiple times.

Furthermore, Hardy's method is used to position the radiotherapy beams. There is nothing in Ozaki to position, other than the z-position of the table. There is no teaching that sag at the measurement position would have any effect on the CT measurement.

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Finally, applicants submit that Hardy and Ozaki are not in the same field of endeavor. The field of radiotherapy and imaging are distinct fields, utilizing different techniques and requiring different resolutions and accuracies. Applicants submit that a person of the art would not have looked in one of these fields to find a solution to the problems in the other of the fields.

Further reasons for lack of *prima facie* obviousness

In addition to the reasons given above for the lack of *prima facie* obviousness of even making the combination suggested by the Examiner, applicants submit that the combination is not *prima facie* obvious since, at least for some of the claims, there is no teaching of certain elements in the claims in either reference.

As to claim 2, there is no teaching of adjusting any image in either reference. In Ozaki, the only effect of the CR image is to determine the z-position of the slice. There is no adjustment of the image. In Hardy there is no image at all, except for the separate image taken of the patient with the frame. This image is never adjusted. The radiotherapy system has no means for imaging and certainly no means for adjusting images for any reason, let alone for sag. The Examiner's reliance on the quoted portions of Hardy is believed to be misplaced. A careful reading of Hardy shows that there is no adjustment of any image, only of the radiotherapy position.

As to claim 3, there is no teaching in either reference of using the acquired image to determine the sag. The sag is not determined at the imaging position of Hardy. The images are taken in another system which is unrelated to the sag of the radiotherapy system with which it is used. The Examiner has relied on col. 10, lines 12-15 to support his rejection of claim 3. However, this image is the image of a phantom, not an image of the slice of a subject as in claim 1. Thus, even were the method of Hardy used, it would not meet the limitations of the claim.

As to claim 8, this claim provides for the determination of sag of the supporting element at a position different from the imaging position and using the sag determined at that position to determine the sag at the imaging position. In Hardy the determination of the positioning of the radio-therapeutic beams is made at the same position as the therapy itself. There is no teaching anywhere of making the measurement at one position and determining the sag at another. In the rejection the Examiner has not addressed this difference at all.

Claim 10 is not *prima facie* obvious for the same reason as claim 2.

As to claim 12, the Examiner is incorrect that Ozaki acquires images of a *slice* at two positions. The CR image referred to in the portion referenced by the Examiner is a planar image. Furthermore, the Examiner is incorrect that Ozaki is silent about the *details* of aligning the

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acquired images. In fact, as described in detail above, there is no alignment of the images at all. The images are of different types and have different extents so that it is hard to imagine how the images could be aligned. There is certainly no teaching of aligning them.

As to the final paragraph of the Examiner's rejection of claim 12, this is not obvious for the reasons given above.

While claim 14 is similar to claim 6, the Examiner also refers to his analysis of claim 6 for reasons as to why claim 15 is obvious. Applicants submit that claim 15 contains an additional limitation which is not present in either reference, namely that the determination of the sag is performed on the CT image. There is no hint in either reference of determining the sag on the CT image.

Claims 16 and 17 are not *prima facie* obvious for the same reasons as claim 12.

As to claim 18, Hardy does not assume that one of the positions has zero sag. On the contrary, the portion of Hardy referenced by the Examiner teaches that the position should be adjusted and no assumption should be made.

As to claim 19, the Examiner is incorrect that there is any determination of sag at either position in Ozaki. Ozaki is entirely silent about sag since it is of no account to his measurements, as indicated above.

As to claims 20 and 21, the Examiner relies on his discussion of claim 2. However, claim 2 does not mention compensation for differences of sag at two positions. As indicated above, this feature is not present in the prior art references.

Claims 7, 11, 13, 23 and 24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ozaki and Hardy and further in view of Liu. Applicants respectfully traverse the rejection and submit that the combination does not provide a *prima facie* case of obviousness.

All of these claims provide that the image with respect to which the sag is determined is an NM image. The Examiner reasons that it would have been obvious to determine the sag in Lui for the reasons given. However, the Examiner is incorrect in his reasoning.

Firstly, the Lui reference is directed to MRI images and not to NM images. Thus, the combination does not make the claims *prima facie* obvious. Second, the images that are acquired are a type of planar image. For such images sag is not a factor. Furthermore, for images which are not to be matched to other images there is no reason for determining the exact position of the slices, since the reasons given by the Examiner are not relevant to imaging of the type discussed in either Lui or Ozaki.

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Claim 27 stands rejected under 35 U.S.C. §102(b) as being anticipated by Hardy. Applicants respectfully traverse the rejection and submit that Hardy does not provide a *prima facie* case of anticipation.

The Examiner relies on col. 4, lines 38-48 to support his contention of anticipation. Applicants respectfully disagree with the Examiner's analysis.

There is no teaching in Hardy of acquiring measurements of sag in a plurality of situations. What Hardy says in the quoted section is that he can correct for a number of errors with his method. However, the measurement that he makes is made in only a single position. Furthermore there is no teaching of accumulating data. Finally there is no teaching of using the accumulated data to estimate the sag. At best Hardy corrects *inter alia* for sag at a single position based on a measurement made at that position.

Claim 28 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hardy in view of Ozaki. Applicants respectfully traverse the rejection and submit that the combination does not provide a *prima facie* case of obviousness.

Applicants refer to the discussion above regarding the lack of *prima facie* obvious in making the combination.

In addition, applicants respectfully submit that Hardy does not teach what the Examiner says he does. There is no teaching in Hardy of measuring sag at a plurality of position. Hardy requires a very accurate determination of position and thus makes his determination at the site that the radiotherapy is to be performed. Second, as indicated above, Hardy does not adjust any images. Hardy is not interested in correcting images, only in positioning his beam. Adjustment of images would have no purpose. Hardy only adjusts the zero position of his system in the computer; there is no movement of the patient at all.

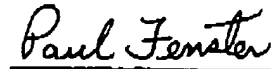
The idea of estimating the sag (or estimating anything else) goes against the very strict position requirements of Hardy. These are in the 1000th's of a mm. The portion referred to by the Examiner contains no mention of estimating anything. It only refers to eliminating or reducing errors.

Furthermore, Ozaki does not teach what the Examiner says that he teaches. The portion referred to by the Examiner refers to a CT system that stores slices together with an indication of the slice positions. This is completely unrelated to sag.

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In view of the above discussion, applicants submit that the claims are all *prima facie* unobvious and unanticipated and are patentable. Notice to that effect is respectfully awaited.

Respectfully submitted,
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